

WHAT IS CLAIMED IS:

1. A magnetic head for reproducing a signal recorded on a recording medium, comprising:

a substrate;

a magnetic head core provided on the substrate, having a magnetic gap; and

a first magnetoresistance device provided on the magnetic head core,

wherein the magnetic head core is provided in such a manner that a thickness direction of the magnetic head core around the magnetic gap is substantially the same as a track width direction of the recording medium.

2. A magnetic head according to claim 1 further comprising a second magnetoresistance device provided on the magnetic head core.

3. A magnetic head according to claim 2, wherein the first magnetoresistance device and the second magnetoresistance device are provided symmetrically with respect to the magnetic gap.

4. A magnetic head according to claim 1 further comprising a coil, wherein the coil is provided in such a manner that at least a portion of the magnetic head core is surrounded by the coil; and a signal is recorded onto the recording medium by a magnetic field from the magnetic head core generated by the coil.

5. A magnetic head according to claim 1, wherein the first magnetoresistance device comprises:

a first insulating layer provided on the magnetic

head core; and

a first pinned layer provided on a side opposite to the magnetic head core of the first insulating layer, wherein a magnetization direction is not easily rotated in the first pinned layer,

wherein the magnetic head core comprises a first soft magnetic layer provided at a position corresponding to the first insulating layer; and the first soft magnetic layer functions as a first free layer of the first magnetoresistance device, wherein a magnetization direction is easily rotated in the first free layer.

6. A magnetic head according to claim 2, wherein the second magnetoresistance device comprises:

a second insulating layer provided on the magnetic head core; and

a second pinned layer provided on a side opposite to the magnetic head core of the second insulating layer, wherein a magnetization direction is not easily rotated in the second pinned layer,

wherein the magnetic head core comprises a second soft magnetic layer provided at a position corresponding to the second insulating layer; and the second soft magnetic layer functions as a second free layer of the second magnetoresistance device, wherein a magnetization direction is easily rotated in the second free layer.

7. A magnetic head according to claim 6, wherein the first soft magnetic layer and the second soft magnetic layer are the same soft magnetic layer.

8. A magnetic head according to claim 1 further comprising a laser condenser for heating a region of the recording

medium in the vicinity of the magnetic gap.

9. A magnetic head according to claim 8, wherein the substrate functions as the laser condenser.

10. A magnetic head according to claim 8, wherein the laser condenser comprises a diffraction optical device.

11. A magnetic head according to claim 10, the diffraction optical device is a Fresnel lens.

12. A magnetic head according to claim 1, wherein the magnetic head core comprises at least one of NiFe(-Co), CoFe, CoFeB and CoNbZr.

13. A magnetic head according to claim 5, wherein the first pinned layer comprises Co or CoFe pinned by PtMn, IrMn, or NiMn.

14. A magnetic head according to claim 6, wherein the second pinned layer comprises Co or CoFe pinned by PtMn, IrMn, or NiMn.

15. A recording/reproducing apparatus comprising:
a magnetic head according to claim 1; and
the recording medium comprising a first magnetic layer.

16. A recording/reproducing apparatus according to claim 15, wherein the first magnetic layer has a compensation temperature and a Curie temperature.

17. A recording/reproducing apparatus according to

claim 16, wherein the compensation temperature is in the range between room temperature and about 100°C, and the Curie temperature is in the range between about 200°C and about 300°C.

18. A recording/reproducing apparatus according to claim 15, wherein the first magnetic layer comprises a second magnetic layer for recording and a third magnetic layer for reproducing.

19. A recording/reproducing apparatus according to claim 15, wherein the recording medium comprises magnetic film micro dots magnetically separated from each other.

20. A recording/reproducing apparatus according to claim 15, wherein the recording medium is a vertical magnetic storage medium.

21. A recording/reproducing apparatus according to claim 15, wherein the recording medium is a disk.

22. A recording/reproducing apparatus according to claim 15, wherein the recording medium is a tape.

23. A recording/reproducing apparatus according to claim 15 further comprising:

- a support for supporting the substrate;
- a first driving section for driving the support; and
- a second driving section for providing a movement of the magnetic head, provided on the substrate.

24. A recording/reproducing apparatus according to claim 23, wherein the second driving section comprises a

thin film; and a movement of the magnetic head is provided by displacement of the thin film in a thickness direction thereof.

25. A recording/reproducing apparatus according to claim 23, wherein the second driving section is driven by a piezoelectric system, an electrostatic system, or an electromagnetic system.

26. A recording/reproducing apparatus according to claim 23 further comprising a plurality of the magnetic heads, wherein the plurality of the magnetic heads are simultaneously driven by the first driving section.

27. A recording/reproducing apparatus according to claim 15, wherein the first magnetic layer comprises at least one of CoCr, CoPt, CoCrPt, CoCrTa, CoTaCrPt, FePt, TbFe, TbFeCo, and GdFeCo.

28. A recording/reproducing apparatus according to claim 18, wherein the second magnetic layer comprises TbFe or TbFeCo; and the third magnetic layer comprises GdFeCo.

29. A magnetic head for reproducing a signal recorded on a recording medium, comprising:

- a substrate;

- a magnetic head core provided on the substrate, having a magnetic gap; and

- a first magnetoresistance device provided on the magnetic head core,

- wherein the first magnetoresistance device comprises:

- a first insulating layer provided on the magnetic head core; and

a first pinned layer provided on a side opposite to the magnetic head core of the first insulating layer, wherein a magnetization direction is not easily rotated in the first pinned layer,

wherein the magnetic head core comprises a first soft magnetic layer provided at a position corresponding to the first insulating layer; and the first soft magnetic layer functions as a first free layer of the first magnetoresistance device, wherein a magnetization direction is easily rotated in the first free layer.

30. A magnetic head according to claim 29 further comprising a second magnetoresistance device provided on the magnetic head core,

wherein the second magnetoresistance device comprises:

a second insulating layer provided on the magnetic head core; and

a second pinned layer provided on a side opposite to the magnetic head core of the second insulating layer, wherein a magnetization direction is not easily rotated in the second pinned layer,

wherein the magnetic head core comprises a second soft magnetic layer provided at a position corresponding to the second insulating layer; and the second soft magnetic layer functions as a second free layer of the second magnetoresistance device, wherein a magnetization direction is easily rotated in the second free layer.

31. A magnetic head according to claim 30, wherein the first magnetoresistance device and the second magnetoresistance device are provided symmetrically with respect to the magnetic gap.

32. A magnetic head according to claim 30, wherein the first soft magnetic layer and the second soft magnetic layer are the same soft magnetic layer.

33. A magnetic head according to claim 29 further comprising a coil, wherein the coil is provided in such a manner that at least a portion of the magnetic head core is surrounded by the coil; and a signal is recorded on the recording medium by a magnetic field from the magnetic head core generated by the coil.

34. A magnetic head according to claim 29 further comprising a laser condenser for heating a region of the recording medium in the vicinity of the magnetic gap.

35. A magnetic head according to claim 34, wherein the substrate functions as the laser condenser.

36. A magnetic head according to claim 34, wherein the laser condenser comprises a diffraction optical device.

37. A magnetic head according to claim 36, wherein the diffraction optical device is a Fresnel lens.

38. A magnetic head according to claim 29, wherein the magnetic head core comprises at least one of NiFe(-Co), CoFe, CoFeB and CoNbZr.

39. A magnetic head according to claim 29, wherein the first pinned layer comprises Co or CoFe pinned by PtMn, IrMn, or NiMn.

40. A magnetic head according to claim 30, wherein the

second pinned layer comprises Co or CoFe pinned by PtMn, IrMn, or NiMn.

41. A recording/reproducing apparatus comprising:
a magnetic head according to claim 29; and
the recording medium comprising a first magnetic layer.

42. A recording/reproducing apparatus according to claim 41, wherein the first magnetic layer has a compensation temperature and a Curie temperature.

43. A recording/reproducing apparatus according to claim 42, wherein the compensation temperature is in the range between room temperature and about 100°C, and the Curie temperature is in the range between about 200°C and about 300°C.

44. A recording/reproducing apparatus according to claim 41, wherein the first magnetic layer comprises a second magnetic layer for recording and a third magnetic layer for reproducing.

45. A recording/reproducing apparatus according to claim 41, wherein the recording medium comprises magnetic film micro dots magnetically separated from each other.

46. A recording/reproducing apparatus according to claim 41, wherein the recording medium is a vertical magnetic storage medium.

47. A recording/reproducing apparatus according to claim 41, wherein the recording medium is a disk.

48. A recording/reproducing apparatus according to claim 41, wherein the recording medium is a tape.

49. A recording/reproducing apparatus according to claim 41 further comprising:

- a support for supporting the substrate;
- a first driving section for driving the support; and
- a second driving section for providing a movement of the magnetic head, provided on the substrate.

50. A recording/reproducing apparatus according to claim 49, wherein the second driving section comprises a thin film; and a movement of the magnetic head is provided by displacement of the thin film in a thickness direction thereof.

51. A recording/reproducing apparatus according to claim 49, wherein the second driving section is driven by a piezoelectric system, an electrostatic system, or an electromagnetic system.

52. A recording/reproducing apparatus according to claim 49 further comprising a plurality of the magnetic heads, wherein the plurality of the magnetic heads are simultaneously driven by the first driving section.

53. A recording/reproducing apparatus according to claim 41, wherein the first magnetic layer comprises at least one of CoCr, CoPt, CoCrPt, CoCrTa, CoTaCrPt, FePt, TbFe, TbFeCo, and GdFeCo.

54. A recording/reproducing apparatus according to

claim 44, wherein the second magnetic layer comprises TbFe or TbFeCo; and the third magnetic layer comprises GdFeCo.

55. A magnetic head for reproducing a signal recorded on a recording medium, comprising:

- a substrate;

- a magnetic head core provided on the substrate, having a magnetic gap; and

- a coil provided in such a manner that at least a portion of the magnetic head core is surrounded by the coil,

- wherein a signal is recorded on the recording medium by a magnetic field from the magnetic head core generated by the coil; and the magnetic head core is provided in such a manner that a thickness direction of the magnetic head core around the magnetic gap is substantially the same as a track width direction of the recording medium.

56. A recording/reproducing apparatus comprising:

- a first magnetic head for recording a signal onto a recording medium; and

- a second magnetic head for reproducing the signal recorded on the recording medium;

- wherein:

- the first magnetic head comprises:

- a first substrate;

- a first magnetic head core provided on the first substrate, having a first magnetic gap; and

- a coil provided in such a manner that at least a portion of the magnetic head core is surrounded by the coil,

- wherein the first magnetic head core is provided in such a manner that a thickness direction of the first magnetic head core around the first magnetic gap is

substantially the same as a track width direction of the recording medium; and

the second magnetic head comprises:

a second substrate;

a second magnetic head core provided on the second substrate, having a second magnetic gap; and

a first magnetoresistance device provided on the second magnetic head core,

wherein the second magnetic head core is provided in such a manner that a thickness direction of the second magnetic head core around the second magnetic gap is substantially the same as a track width direction of the recording medium.

57. A recording/reproducing apparatus according to claim 56, wherein the first substrate and the second substrate are the same substrate.

58. A recording/reproducing apparatus according to claim 56 further comprising a second magnetoresistance device provided on the second magnetic head core.

59. A recording/reproducing apparatus according to claim 58, wherein the first magnetoresistance device and the second magnetoresistance device are provided symmetrically with respect to the second magnetic gap.

60. A recording/reproducing apparatus comprising:

a first magnetic head for recording a signal onto a recording medium; and

a second magnetic head for reproducing the signal recorded on the recording medium;

wherein:

the first magnetic head comprises:

a first substrate;

a first magnetic head core provided on the first substrate, having a first magnetic gap; and

a coil provided in such a manner that at least a portion of the first magnetic head core is surrounded by the coil,

wherein the first magnetic head core is provided in such a manner that a thickness direction of the first magnetic head core around the first magnetic gap is substantially the same as a track width direction of the recording medium; and

the second magnetic head comprises:

a second substrate;

a second magnetic head core provided on the second substrate, having a second magnetic gap; and

a first magnetoresistance device provided on the second magnetic head core,

wherein the first magnetoresistance device comprises:

an insulating layer provided on the second magnetic head core; and

a pinned layer provided on a side opposite to the second magnetic head core of the insulating layer, wherein a magnetization direction is not easily rotated in the pinned layer,

wherein the second magnetic head core comprises a soft magnetic layer provided at a position corresponding to the second insulating layer; and the soft magnetic layer functions as a free layer of the first magnetoresistance device, wherein a magnetization direction is easily rotated in the free layer.

61. A recording/reproducing apparatus according to claim 60, wherein the first substrate and the second substrate are the same substrate.

62. A recording/reproducing apparatus according to claim 60 further comprising a second magnetoresistance device provided on the second magnetic head core.

63. A recording/reproducing apparatus according to claim 62, wherein the first magnetoresistance device and the second magnetoresistance device are provided symmetrically with respect to the second magnetic gap.